REMARKS

In the office action noted above, independent claim 10 was objected to in that on lines 2 and 3, "the adaptive optics system" had insufficient antecedent basis for this limitation. Appropriate correction was required. In response, claim 10 was amended to change "the" to --an-- to indicate that the adaptive optics system is initially recited into the claim at line 2. Accordingly, it is respectfully requested that the objection to claim 10 be withdrawn.

In addition, an obvious error in the dependency of dependent claims 11 and 13 was discovered and corrected by amendment. More specifically, both claims 11 and 13 recited dependency from claim 1. However, both of these claims referred to a processing step which is not found in claim 1, but rather in claim 10. Obviously, the claims 11 and 13 were intended to be dependent from claim 10.

Also in the same office action, independent claims 1 and 10 were rejected under 35 U.S.C. 102(b) as being anticipated by the U.S. patent no. 4,750,818 to Cochran. It is asserted that Cochran discloses all of the elements of claim 1 and steps of claim 10 and that the estimation matrix H employed by Cochran maximizes performance of the system by assuming certain systems and environmental conditions and may be used to calibrate for weather effects or intensity (amplitude) fluctuations, and thus, may be considered a slope weighting function. Applicant respectfully traverses the rejection of claims 1 and 10 and offers the following remarks in support of this position.

Cochran employs a plurality of wavefront sensors or detectors that measure wavefront disturbances to provide wavefront slope measurements, and a digital processor for efficiently calculating actuator commands for a deformable mirror from the wavefront measurements using sparse matrix calculations (see col. 4, lines 56-68). The calculation involves 2 stages - a preparation stage and a solve stage (see top col. 5). The preparation stage involves the a wavefront sensor derivative matrix H which is calculated from the movement of actuators and the measurements for the wavefront sensors in response thereto (see bottom of col. 2). Accordingly, the matrix H consists of the derivatives of wavefront slope measurements with respect to actuator motions. Most of the derivatives are zero, making the estimator matrix H a sparse matrix. (see top of col. 3). The solve stage uses the sparse matrix H transposed H^T to multiply the input slope data s from the wavefront sensors (see col. 5, lines 22-24). This is refered to by Cochran as the sparse matrix approach (see col. 5, lines 48-49).

Cochran's preparation stage is intended to be performed only infrequently and updated only upon a substantial change in the sensor or actuator array or upon a change in the nature of the atmosphere (see col. 5, lines 18-21). However, Cochran suggests the possibility of using this sparse matrix approach to deal with scintillation if the calculations could be performed at very high speed, i.e. changing the estimation matrix H in real time, possibly through the use of parallel processors. But, Cochran realizes that this may be possible only due to the sparseness of the estimation matrix H. (see col. 5, line 64 to col. 6, line 20).

In contrast, independent claim 1 recites an adaptive optics system comprising a wavefront sensor comprising a plurality of subapertures for receiving optical energy that is reflected from the deformable mirror and for determining a slope and amplitude of the optical energy in each subaperture. In addition, independent claim 10 recites the step of determining a slope and amplitude of the optical energy received by each subaperture. Cochran teaches wavefront sensors that provide only wavefront slope measurements as noted above and do not provide additional amplitude measurements of the optical energy as recited in claims 1 and 10.

Also, claim 1 recites a slope weighting function in communication with the wavefront sensor for receiving the slope and amplitude information for each subaperture from the wavefront sensor and for processing the slope and amplitude information. Also, claim 10 recites the step of processing the slope and amplitude information to weight the slope measurements. Since the wavefront sensors of Cochran do not provide the additional amplitude measurements, Cochran does not teach the processing of both slope and amplitude information to weight the slope measurements. Rather, Cochran teaches weighting the slope measurements with an estimation matrix H which consists of derivatives of the wavefront slope measurements with respect to actuator motions, and since most of the derivatives are zero, the estimator matrix H is considered a sparse matrix. No amplitude data is ostensibly involved in the weighting function of Cochran.

For the reasons given above, independent claims 1 and 10 clearly distinguish from the teachings of the cited reference to Cochran and are considered novel and patentable thereover.

In the office action, dependent clams 7-9 were rejected under 35 U.S.C. 103(a) as being unpatentable over Cochran by itself or Cochran in combination with Rather et al. or Wisner et al. In response, since dependent claims 7-9 include all of the limitations of their parent claim 1, they are also considered patentable over the cited references of record for at least the same reasons

given above for their parent claim 1. Accordingly, it is respectfully requested that the rejection of claims 1 and 7-10 be withdrawn.

Applicant acknowledges that claims 2-6 and 11-15 were considered to contain allowable subject matter. However, Applicant believes that all of the claims 1-15 are considered allowable over the references cited against them based on the above remarks and over the reference to Friedman et al. which was not cited against claim 1, but considered pertinent thereto. The foregoing described distinguishing elements of claim 1 will also apply to Friedman et al.

In view of the above, the application is considered in condition for allowance and therefore, an early issuance thereof is earnestly solicited.

Respectfully submitted,

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I hereby certify that this *Office Response* is being deposited on this, the 30 day of June 2003, with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.

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